

### Section 103 rejections

In the Official Action of February 14, it is said that many of the claims are obvious over Beauchamp, in view of Vincent '059 or Bauer — and in various combinations with other references. For the reasons detailed below, Applicants respectfully traverse. The discussion below is organized by the paragraph numbers in the Official Action.

Ad 8 (starting at page 5 of the Official Action) — In the Action it is said that Beauchamp discloses all of what appears in claims 1 and 2, except "a second sensor for making color measurements." It is also said that Vincent discloses a sensor "which may be mounted to a carriage for making color measurements." This much is true.

This paragraph of the Action, however, then concludes that it would have been obvious to incorporate Vincent's sensor into Beauchamp's invention "for the purpose of detecting color value printing errors for correction . . . ." The Applicants respectfully point out, however, that neither Vincent nor Beauchamp suggests using both a colorimeter like Vincent's and a line sensor like Beauchamp's.

In fact the art solidly teaches away from such a combination. Instead it is known in printer products to use a single sensor — very specifically, a line sensor of generally the Beauchamp type — to perform both alignment and basic colorimetry-equivalent measurements.

This dual function is accomplished by carefully calibrating the line sensor for the inks and media in use — and then using the sensor, calibrated in this way, to make relative

tonal-density measurements that are adequate for linearizing tone ramps for each colorant in turn. These relatively crude measurements are not as well grounded, theoretically, as the true "densitometry" techniques described in the present application bridging pages 5 and 6.

Such dual-use sensor systems are discussed in the present application starting on page 8, under the heading "(b) Automatic on-line calibration" — and continuing to the center of page 11. In that passage, the dual-use sensor methods are called "pseudodensitometry".

The techniques described in that passage represent the state of the art. For colorimetry-equivalent measurements they are virtually free, since the hardware is already installed for use in printhead alignment and the like.

Applicant's passage from pages 8 through 11 sets forth the handicaps and drawbacks of the dual-sensor-use pseudodensitometry method. This presentation, however, is given by the Applicant, preliminary to introducing the Applicant's dual-sensor invention of claim 1 — it is not any part of the Beauchamp or Vincent teachings, and accordingly cannot be used in "20-20 hindsight" to establish that Applicants' inventive combination is obvious.

The cited art contains no suggestion of the combination, and the known art in commerce teaches away from the combination. Therefore Applicants submit that rejection of claims 1 and 2 over Beauchamp and Vincent is improper, and respectfully ask that the rejection be withdrawn.

Ad 9 (starting at page 6 of the Official Action) — In the Action it is further said that seven claims (claims 3 through 5, claim 8, and claims 11 through 14) are obvious over the same combination of Beauchamp and Vincent with yet another refer-

ence, Hirano. The Action goes on to argue that Hirano "provides a general teaching" directed at a problem "similar" to the Applicant's problem.

It turns out that the ostensible "general teaching" about the "similar" problem relates to putting one "device" on one carriage and the other "device" on another carriage. The Applicants very strenuously protest this entirely improper argumentation, and respectfully ask that the rejection be withdrawn.

If this type of argument were permissible in rejection of claims, virtually nothing would be patentable:

- (1) It begins with a two-reference rejection that is itself an overstretch since — as pointed out in above — the references do not suggest the combination and the art teaches away. This part of the rejection remains just as improper in rejecting these seven claims as it is in rejection of claims 1 and 2.
- (2) The argument in the Action then goes on to add a third reference, a step which in itself is suspect. Of course there is no hard-and-fast rule against combining multiple references; however, it goes without saying that the more references are combined, as a practical matter the less obvious it is to a person of ordinary skill to make the jump.
- (3) More egregious still, the third reference (Hirano) does not even say anything about sensors, colorimeters, pseudodensitometry, etc. It only teaches putting printheads on two different carriages.

The proposition seems to be that all "devices" are fungible, so as long as a reference teaches two carriages

each holding any kind of device, then all other uses of two carriages to hold any other kind of device must be obvious.

In short, the Official Action takes a very broad, conceptual approach to analyzing the art, and in effect sweepingly reconstructing the art in conceptual terms — rather than looking at the mechanical and electrical things and practical implementations that are actually present. With respect, this approach sweeps far more broadly than customary.

Furthermore, even with all of these stretches of argumentation, the combination proposed in the Official Action still fails to come up to the Applicant's invention. The invention positions a second carriage — which carries a second, colorimetric sensor — with low positioning accuracy (see specification at page 35, lines 29 through 31) to positions for reading multiple color patches in turn.

As a matter of objective fact, in colorimetric test patterns in commercial use nowadays individual patches are ordinarily made roughly 5 mm (1/5 inch) square — although at the time the present application was filed, a more typical value was roughly 25 mm (one inch) square. To center a colorimeter over a patch, it suffices to position the colorimeter to within very roughly one tenth of the patch dimension, which comes to roughly 1/2 mm modernly, or 2½ mm at the time the application was filed.

Hence the second carriage need only roughly center the colorimeter over a patch to some accuracy from, say, 0.5 mm to 2½ mm (i. e. about 1/50 to 1/10 inch). This is far less demanding than the accuracy needed for printing — such as would be needed currently for either of Hirano's carriages.

By comparison, Hirano's second carriage (the color carriage, for his heavier complement of several printheads) instead must operate to at least the same positioning accuracy as his first carriage, namely the extremely high accuracy that is required to print multiple colors in registration, for construction of a color image. This accuracy would be on the order of a fraction of the pixel-grid spacing, namely of 1/48 or 1/24 mm (for printing at 1200 or 600 dots/inch respectively).

Taking that necessary fraction as roughly 1/5, the accuracy needed for printing is at least as fine as 1/5 of 1/24 mm, i. e. about 1/120 mm or 0.08 mm. Even as compared with the 0.5 mm positioning required for current patches, this is a ratio of 0.5/0.08, which is more than six; and a fairer comparison with patches at the time of filing suggests a ratio of  $2.5/0.08 = 30$ .

To summarize, the positioning accuracy needed for the present sensing invention is between six and thirty times coarser than needed by printing systems (either those used currently or Hirano's system). In Hirano, by comparison, accuracy required for his heavy carriage is equal to or finer than that for his light carriage.

The general point of these distinctions is implicit in the subject claims as initially presented, and Applicants therefore believe that the claims are valid as initially deposited. Nevertheless new dependent claims 50 and 51 have been added to more clearly emphasize the very low positioning accuracy and speed that suffice for the colorimeter carriage in Applicant's invention.

Ad 10 and 14 (pages 7 and 9 of the Official Action) — In the Action it is further said that another seven claims (namely 6,

7, 9, 19 20, 22 and 23) once again are obvious over the same combination of Beauchamp and Vincent with another reference, Vincent '518 — and two other claims, 17 and 18, are obvious over the same three-way combination plus Hirano.

In these rejections too, the Official Action adopts the same improper stance of arguing from a broadly based, sweeping conceptual viewpoint. Specifically, whereas Applicants claim a relatively humble refinement of a movable hood — and a mechanism for moving the hood — evidently it was not possible to find such a thing in the art.

The Official Action attempts to brush aside this inadequacy of the prior art by arguing that a hood in Vincent '518 (emphases added) "performs the same function as the applicant's hood" and then that Vincent says "it should extend" in such-and-such a fashion, and finally that "any modification which would make it [like the Applicants' hood] would have been obvious". One or another of such arguments, considered singly, may be proper in an appropriate case — but what is required is some fundamental grounding of the rejection on a plain, mechanical, factual connection from the art to the invention.

Here there is no machine-movable and automatically moved hood in the art, and the underlying rejection of the base-claim combination is already dependent on an unmotivated combination — from which the art teaches away. A person of ordinary skill cannot make the leap all the way from (a) two separate sensors to (b) two sensors used together plus an automatically moved hood. The compulsory statutory standard, the person of ordinary skill, is not to be thought of as an inventor — only just a yeoman technical person.

Furthermore, as to claims 17 and 18, the Action proposes that such a person of ordinary skill could also add and adapt

Hirano's dual printhead carriages into the jumbo combination. This is not realistic.

Ad 11 and 12 (page 8 of the Official Action) — In the Action it is further said that claims 10 and 15 are obvious over another three-way rejection. This one adds Bauer to the already overburdened combination of Beauchamp and Vincent.

Whereas Applicants' claim goes to a line or color sensor, Bauer's invention relates to a dynamic inkdrop sensor — i. e. a unit for detecting inkdrops while they are flying through the air. Bauer's system is not for measuring color at all, and not for analyzing anything printed on paper either, but if anything may be more reminiscent of a radar/lidar system, or maybe a missile tracker.

Furthermore, Applicants' claim 10 expressly recites a "color reference target" — but what is called a "reference target" in the Official Action is actually an aperture pattern. In other words, it is basically a hole.

With respect, it is hard to see how a hole can be classed as a "color reference target", or combinable with anything that is or has a color reference target. All things considered, the Bauer reference is essentially irrelevant to the Applicants' claim.

Similarly claim 15 recites a reference target for use as part of a "sensor for making color measurements of marks formed on a medium" — and this characterization is clearly inconsistent with a reference target that is an aperture pattern. There is a truly fundamental difference between "color . . . marks formed on a medium" — on one hand — and a hole, on the other hand.

Ad 13 (starting at page 8 of the Official Action) — In the Action it is further said that claim 16 is obvious over the same three-reference combination as claims 10 and 15 (see above) plus in addition a fourth reference, Ciza. Since this Ciza patent teaches a colorimetric reference target, it is proposed in the Official Action that it would be obvious to import a colorimetric reference target into Bauer, for importation in turn into the unsteady combination of Beauchamp and Vincent.

Ciza's color target is used in an industrial process-stream chemical system for measuring colors in a flow of product through a pipeline, and thus is wholly inconsistent with anything like the present invention — which measures colors printed (within a printer) on paper or like printing medium. They are apples and oranges.

Ciza's target is also radically unrelated to the Bauer aperture pattern. Of course it goes without saying that it is possible to find a colorimetric reference target in industry, and even in the color-printer art, but this alone is not sufficient — it must be linked to the claimed invention in some way that is meaningful.

What is here proposed in the Official Action is not a combination but rather a complete substitution. With greatest of respect, it is an improper combination supporting an improper rejection, and the Applicants respectfully ask that this rejection too be withdrawn.

Ad 15 (starting at page 10 of the Official Action) — In the Action it is further said that claims 21 and 24 are obvious over another remarkable four-way combination including a reference identified only as "Thermagon, Inc." First, the underlying three-way combination is improper for all the reasons set forth earlier.



Second, it is further improper to add into such a combination yet a fourth isolated reference with an isolated feature of a compliant seal. Naturally there are compliant seals in the world and perhaps even in the printer art, but there is no showing of any relation to the Beauchamp/Vincent/Vincent combination.

Third, no Thermagon reference appears to be cited in the Official Actions or otherwise of record in this case. For all these reasons, the Applicants respectfully request withdrawal of this rejection.

Ad 16 (page 11 of the Official Action) — In the Action it is further said that claim 25 is obvious over yet another four-way combination, Beauchamp/Vincent/Vincent plus Bauer. The foregoing discussions have already set forth deficiencies of Beauchamp/Vincent as to Applicant's basic combination (they only teach separate use of two sensors considered singly), and of Bauer (his targets are holes, not color patterns).

Furthermore the Official Action first posits that Bauer "presumably" involves a manual operation, and then piggybacks the idea that it would be obvious to substitute an automatic operation — because automaticity is only a "routine" refinement of manual operation. In this complex of presumptions piled on top of an inadequate basic combination, what has been additionally swept aside is this important question: when is it just routine to substitute automatic for manual operation?

It is not always routine. Rather it is routine only when the underlying manual operation is amenable to performance in a basically rote way, without some form of guiding intelligence as to the condition of the mechanism before, during and after the operation.

At least it must be plain for a person of ordinary skill to see a way to teach a machine how to acquire information about such mechanical conditions, and how to factor such information into a proposed automatic operation. No such consideration is undertaken in the Official Action.

Ad 17 (starting on page 11 of the Official Action) — In the Action it is further said that eleven claims (26 through 30, 35, 36, and 42 through 45) are obvious over Beauchamp and Bauer. Of these, Applicants have now amended claims 27 through 30, and also claim 35 (and its dependent claim 36), to depend from claim 32.

Claim 32 in turn has been amended as prescribed in paragraph 20 of the Official Action, and is believed to be now in condition for allowance. Hence its newly dependent claims 27 through 30, 35 and 36 too are also all believed to be in condition for allowance.

Therefore this rejection now applies only to claim 26 and claims 42 through 45. Claim 26 recites a sensor for measuring characteristics of ink markings on a printing medium, and a protective door for shielding the sensor when the sensor is not in use.

Beauchamp does teach a printed-image sensor, and perhaps Bauer arguably teaches something that might be termed a protective door — although this point is debatable. As noted above, however, Bauer's invention is in a device for detecting inkdrops in flight, not anything capable of colorimetry.

That is to say, Bauer's unit is capable of colorimetry (and even pseudodensitometry) of NEITHER a mark on paper NOR ink in a trajectory. Accordingly Bauer is not meaningfully combinable with Beauchamp.

In other words, Bauer actually is incompatible with Beauchamp in two different ways:

- (1) Bauer cannot measure what is on paper, whereas Beauchamp is only for measuring what is on paper; and
- (2) Bauer cannot detect or measure ink tones, whereas Beauchamp is in fact used at least to detect ink tones.

Therefore the Applicants respectfully submit that the combination of Beauchamp and Bauer is not proper for purposes of supporting the claim-26 rejection, which accordingly should be withdrawn. Dependent claims 35, 36, and 43 through 45 further limit the combination of claim 26, and therefore are distinguished *a fortiori*.

Rejection of the dependent claims included in this group (paragraph 17 of the Action) is also subject to the Applicants' earlier comments about substitution of automaticity for manual operation. The doctrine of Venner, cited several times in the present Action, may be good on the facts of Venner but not across the board for all relationships between automatic and manual systems — and the Official Action has failed to suggest any consideration of this aspect of the matter.

A still stronger issue relates to dependent claim 45. This claim recites shutter actuation by carriage motion, and is supported in the specification at page 34, lines 28 ff. Rejection of claim 45, however, is not supported by any reasoning or citation directed to the actuation of a shutter by carriage motion. Claim 45 therefore is believed to be allowable.

Ad 18 (page 14 of the Official Action) — In the Action it is further said that the Beauchamp/Bauer combination discussed above can be augmented by addition of Vincent '059 to render Applicants' claim 31 obvious. In particular in the Official Action it is proposed to add the Vincent colorimeter into the combined Beauchamp line sensor and Bauer drop detector.

The Applicants respectfully point out, however, that none of the three references suggests such a combination. In fact as explained earlier the combination of the two optical sensors alone, even without Bauer's inkdrop detector, is not only wholly unmotivated but also contrary to the teachings of the art.

Furthermore Bauer's dynamic in-flight-inkdrop detector is just as alien to Vincent's printed-image colorimeter as it is to Beauchamp's printed-image line sensor. Detecting passage of a ballistic drop, in transit — something like watching bullets go by! — is in an entirely different world from analyzing tone values of dry ink on paper.

Ad 19 (page 15 of the Official Action) — In the Action it is further said that the Beauchamp/Bauer combination discussed above can be enhanced by adding Ciza, to defeat Applicants' claims 46 through 49. Once again, Applicants traverse — not only because the Beauchamp printed-line sensor and Bauer drop-interceptor detector are conceptually incompatible, but also because the Ciza process-stream color analyzer is equally incompatible with both Beauchamp and Bauer.

The rejection seems to derive from an idea that all optical systems are interchangeable or at least in analogous arts. The physical truth is that a process-stream colorimeter designer is in a remote art and will never see either an inkjet drop detector or a printed-line sensor.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request the Examiner's favorable reconsideration and allowance of all the claims now standing in this case.

It is respectfully requested that, should there appear any further obstacle to allowance of the claims herein, the Examiner telephone the undersigned attorney to try to resolve the obstacle.

Respectfully submitted,



PETER I. LIPPMAN

Registration No. 22,835

Attorney for the Applicants

Ashen & Lippman  
4385 Ocean View Boulevard  
Montrose, California 91020

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TELEPHONE:  
818/249-5961